REMARKS/ARGUMENTS

In the Claims:

Claims 1-18 remain pending in the present application. Claims 1 and 13 have been amended.

Rejection of Claims 1-4 and 6-11 Under 35 U.S.C. § 103(a)

The Examiner rejected claims 1-4 and 6-11 under 35 U.S.C. § 103(a) as being unpatentable over Renkl et al. (US 6,192,968 B1) in view of Harbottle et al. (US 6,357,922 B1). Applicant has amended claim 1 to more clearly describe the subject matter recited therein. As Applicant does not believe Renkl et al. can be properly combined with Harbottle et al., nor that Renkl et al. in view of Harbottle et al. teaches or suggests the subject matter of claims 1-4 and 6-11, the rejection is respectfully traversed.

The present invention consists of a mold spraying system for use in a molding process, wherein the mold spraying system is able to provide an adequate spraying pressure to a spray head associated therewith despite system pressure losses, and despite a high frequency of spraying cycles. Due to the fact that the source(s) of material(s) applied by the spray head are often located a considerable distance from the location of application, pressure losses are common. Also, because of the short cycle time at which many molding machines are operated, the material(s) applied by the spray head are commonly expelled at a rate that makes it difficult to maintain the pressure thereof. To overcome this problem, the system of the present invention employs a separate pressure

boosting device to increase the existing pressure of the material(s) if necessary to ensure that the material(s) are adequately applied to the mold.

With respect to the present rejection, Applicant respectfully submits that there would be no motivation to combine Renkl et al. with Harbottle et al. as suggested by the Examiner. Renkl et al. teaches a process for tempering and/or coating the walls of a mold to prepare the mold for the next molding cycle. Renkl et al. suggests the use of a robot having attached thereto a spray tool equipped with spray nozzles for distributing one or more materials to opposite halves of an open mold. The spray tool must be capable of delivering enough material to substantially cover the entirety of the exposed mold surfaces after each molding cycle.

In contrast, Harbottle et al. teaches a lubrication system for high speed friction bearings, which employs an injector having a nozzle that constrains the injector to providing minute quantities of lubricant at very infrequent intervals. The injector(s) of Harbottle et al. are not designed to provide any significant amount of material, nor to do so on a frequent basis. In fact, it is suggested in Harbottle et al. that a diesel fuel injector can be acceptably used as the lubricant injector.

Consequently, Applicant submits that one wishing to develop a mold spraying system, whether as taught by Renkl et al. or by the present application, would not look to a bearing lubrication system for guidance - especially a bearing lubrication system specifically designed to inject only minute quantities of lubricant at very infrequent intervals. Consequently, Applicant respectfully

submits that there is no motivation to combine Renkl et al. with Harbottle et al. as the Examiner has done in this case.

In any event, even if Renkl et al. is combined with Harbottle et al., the combination does not teach or suggest the system of the present invention. More particularly, Renkl et al. in view of Harbottle et al. does not teach or suggest a pressure boosting device for ensuring an adequate supply of one or more materials to the spray head of a mold spraying system - as is described and claimed in the present application.

First, the injector (D) of Harbottle et al. relied upon by the Examiner cannot be satisfactorily used in the present invention. As can be observed by reference to Harbottle et al. (see Figures 2-5 and column 7, line 16 - column 8, line 11), the injector (D) increases the pressure of the lubricant that it expels by using the pressure of the lubricant *itself* to drive an intensifier piston (104). More specifically, the pressurized lubricant flows through an inlet passage (120), through an open solenoid valve (122), through a supply passage (124), and into an intensifier cylinder (86) where the intensifier piston resides.

This is not how the system of the present invention operates. As the main problem that the system of the present invention overcomes is a lack of adequate material pressure, it certainly would not be desirable to rely on that very pressure to drive the pressure boosting device. In the present invention, the pressure boosting device is connected to a pressure source that is separate from the source of material pressure (see Figure 3). In this manner, the material pressure

will not drop even further as a result of having to actuate the pressure boosting device.

Similalry, injector (H) and injector (I) disclosed in Harbottle et al. (see Figures 8-9 and 11-12, respectively) do not operate in the same manner as the pressure boosting device of the present invention. Injector (H) is not in communication with a supply of a material flowing through a conduit. Rather, injector (H) contains a captive supply of lubricant that is held in a lubricant reservoir (200). Pressurized air is used to boost the pressure of a small amount of the lubricant, which is then ejected from a nozzle of the injector (H). Similarly, injector (I) supplies a small amount of lubricant from a lubricant supply to a plunger cylinder (190) via a lubricant port (238). Again, the material (lubricant) does not flow through the injector (I), because flow thereof is blocked by a solenoid valve (210). Rather, a limited supply of lubricant resides in the plunger cylinder (190) of the injector (I) until the injector is energized.

These injectors (D), (H), (I), do not rely in any way on the initial pressure of the material (lubricant) for the delivery thereof. Indeed, this is not how they are designed to operate. Rather, the injectors are designed to accumulate a small amount of lubricant, boost the pressure of the lubricant, and then eject the small amount of lubricant through a nozzle. Once the accumulated amount of lubricant has been ejected, the injector is refilled.

In the present invention, the pressure of the material(s) passing through the conduit contributes to its emission from the spray head. Passage of the material(s) through the conduit is not blocked by the pressure boosting device,

and the material(s) do not have to be accumulated or stored therein before they can be supplied to the spray head. Rather, the pressure boosting device simply acts to increase the existing pressure of the material(s) if needed as the material(s) travel to the spray head. As can be seen in Figure 3, the conduit and the material(s) therein passes through the pressure boosting device in a substantially uninterrupted manner. If the pressure imparted to the material(s) at the source is sufficient to maintain the supply of material(s) to the spray head as required by the cycling of the molding machine, the pressure boosting device need not be activated. This is not true of, or possible with, the use of *any* of the injectors of Harbottle et al. Instead, activation of the injectors of Harbottle et al. is necessary to expelling (supplying) any of the material in communication therewith. Without activation of the injectors, no material can pass therethrough.

Applicant also submits that the injectors of Harbottle et al. and their method of operation are not suited to use in the system of the present invention. First, the fill/charge (pressurize)/inject cycle of the injectors takes time, and only a limited amount of material can be pressurized and expelled per cycle. The injectors do not appear to be designed to deliver a significant quantity of material with a short cycle time. Rather, the injectors appear to be designed for energization and operation only when necessary to lubricate the bearing with which they are associated. It is stated in Harbottle et al. that the frequency of operation of the injector(s) may range between once every few days to once every few months. (See column 8, lines 39-45). In contrast, the injection

machines with which the system of the present invention are intended to be associated may perform in excess of one thousand cycles per day.

Applicant further submits that the injectors of Harbotlte et al. are not designed to expel (inject) the quantities of material(s) that are required by the present invention. As can be understood by a reading of the present application, the system of the present invention is intended for use with an industrial molding machine having a short cycle time. Consequently, the amount of material(s) applied to the mold of the molding machine can be significant, not only on a daily basis, but also on a per cycle basis. The injectors of Harbottle et al. are not designed to supply pressurized material on this scale. In fact, it is stated that injector (H) of Harbottle et al. is designed to deliver *minute* quantities of lubricant, on the order of 0.003 ml/cycle. (See column 10, lines 27-29). Applicant also submits that the injectors of Harbottle et al. likely would not operate properly if scaled accordingly for use with a molding machine of the present invention. For example, the air pressures required to operate the intensifier cylinders of the injectors at their current scale would likely be wholly inadequate to do so at a scale that would be required by the present invention. As the air pressures suggested are already on the order of 80 PSI, the pressures required at a much larger scale are likely not feasible.

In light of the foregoing discussion, Applicant submits that there are material differences between the teachings of Renkl et al. in view of Harbottle et al. As such, Applicant respectfully submits that Renkl et al. in view of Harbottle et al. cannot support a rejection of claims 1-4 and 6-11 under 35 U.S.C. § 103(a).

Rejection of Claims 5 and 12 Under 35 U.S.C. § 103(a)

The Examiner rejected claims 5 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Renkl et al. in view of Harbottle et al., and further in view of Kitamura et al. (US 5,957,192 B1). Applicant has amended independent claim 1 to more clearly describe the subject matter recited therein. As Applicant believes independent claim 1 to now recite allowable subject matter, claims 5 and 12, which depend therefrom, would also be allowable.

Rejection of Claims 13-18 Under 35 U.S.C. § 103(a)

The Examiner rejected claims 13-18 under 35 U.S.C. § 103(a) as being unpatentable over Harbottle et al. and further in view of Kitamura et al. (Note: although the Examiner's rejection states reliance only Harbottle et al. in view of Kitamura et al., the comments that follow suggest that Renkl et al. was also relied upon). Applicant has amended claim 13 to more clearly describe the subject matter recited therein. As Applicant does not believe Harbottle et al. in view of Kitamura et al. to teach or suggest the subject matter of claims 13-18, the rejection is respectfully traversed.

The shortcomings of Renkl et al. in view of Harbottle et al. have been discussed in detail above. Combining Kitamura et al. with Harbottle et al. does nothing to overcome the deficiencies thereof. More particularly, while Kitamura et al. may teach the use of a controller, Kitamura et al. does not teach or suggest the use of a pressure boosting device that can operate to selectively increase the pressure of an already pressurized material(s) passing therethrough. Like the

injectors of Harbottle et al., the system of Kitamura et al. relies on an injection accumulator (13) to provide a pressure boost. The accumulator does not act on a supply of a material(s) passing therethrough but, rather, pressurizes an accumulated supply of hydraulic fluid for subsequent release to another portion of an injection machine. More specifically, the accumulator is used to supply pressurized hydraulic fluid to a boost cylinder (20) portion of the machine's injection cylinder (10). The injection cylinder is used to drive an injection plunger which forces molten material into a casting mold. Therefore, neither the accumulator or the boost cylinder is used to increase the pressure of a material passing therethrough: the accumulator acts on the boost cylinder, and the boost cylinder acts on the injection cylinder.

Consequently, Applicant submits that the combination of Harbottle et al. in view of Kitamura et al. fails to teach or suggest the pressure boosting apparatus of the present invention. Therefore, Applicant respectfully submits that Harbottle et al. in view of Kitamura et al. cannot support a rejection of claims 13-18 under 35 U.S.C. § 103(a).

CONCLUSION

Applicant has amended claims 1 and 13, and has distinguished the subject matter of the present invention over the teachings of the references cited as prior art by the Examiner.

Therefore, Applicant respectfully submits that the present application is now in condition for allowance, and entry of the present amendment and

allowance of the application as amended is earnestly requested. Telephone inquiry to the undersigned in order to clarify or otherwise expedite prosecution of the present application is respectfully encouraged.

Respectfully submitted,

Date: 7/15/04

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